



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,193	01/14/2004	Shunpei Yamazaki	0553-0394	3577

7590 06/01/2007
COOK, ALEX, McFARRON, MANZO,
CUMMINGS & MEHLER, LTD.
SUITE 2850
200 WEST ADAMS STREET
CHICAGO, IL 60606

EXAMINER

RAYMOND, BRITTANY L

ART UNIT	PAPER NUMBER
----------	--------------

1756

MAIL DATE	DELIVERY MODE
-----------	---------------

06/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/757,193	Applicant(s) YAMAZAKI ET AL.	
	Examiner Brittany Raymond	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/7/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 19, 23, 27, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liegl (U.S. Patent Publication 2004/0121264) in view of Aoki (U.S. Patent Publication 2005/0237350).

Liegl discloses a method of patterning an integrated circuit, comprising the steps of coating a substrate with a photosensitive layer (Paragraph 0010), reducing the pressure of the environment to evaporate the solvent of the photosensitive layer (Paragraph 0014), selectively exposing the photosensitive layer with radiation through a mask, developing the resist to remove either the exposed or unexposed portions depending on the type of resist used, and using the patterned resist as a mask for etching of the substrate (Paragraph 0016), as recited in claims 19, 23, 27, and 31 of the

present invention. Although Liegl does not state that the pressure of the environment is reduced during the coating of the photosensitive layer, it would have been obvious to one of ordinary skill in this art to have done this because it would save time if both steps were performed at the same time. Liegl also discloses that the pressure of the environment during the reduced pressure step can be between about 1 Pa to less than 1×10^5 Pa (Paragraph 0014), which falls within the range recited in claims 27 and 31 of the present invention.

Liegl fails to disclose that a resist pattern is formed by discharging a resist composition, such as by ink jetting.

Aoki discloses in the background that an inkjet image forming apparatus can be used to eject droplets of liquid resists (Paragraph 0002), which would form a layer of a resist pattern, as recited in claims 19, 23, 27, and 31 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have used the inkjet image forming process to form a first resist pattern, as suggested by Aoki, in the process of Liegl, because Aoki teaches that inkjet printing can form a resist pattern quickly without the use of a photolithography process. Since Aoki teaches that inkjet printing only forms drops of resists for a pattern, it would have been obvious to one of ordinary skill in the art to have used the process of Liegl to further form a second, more accurate photoresist pattern out of the first pattern.

3. Claims 24, 26, 28, 30, 32, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liegl (U.S. Patent Publication 2004/0121264) in view of Aoki (U.S.

Patent Publication 2005/0237350), as applied to claims 19, 23, 27, and 31 above, and further in view of Yamaguchi (U.S. Patent Publication 2006/0263722).

The teachings of Liegl and Aoki have been discussed in paragraph 2 above.

Liegl and Aoki fail to disclose that the viscosity of the photoresist composition is at most 100 cp and that the wavelength of light used is in the range of 350 to 450 nm.

Yamaguchi discloses a process of forming a photoresist pattern comprising the use of a photoresist with a viscosity of 1 to 10 cp (Paragraph 0094), as recited in claims 24, 28, and 32 of the present invention. Yamaguchi also discloses that a laser with a wavelength of 200 to 500 nm is used for the exposure step (Paragraph 0097), as recited in claims 26, 30, and 34 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have used a photoresist with a low viscosity and an exposure light with a wavelength between 200 and 500 nm, as suggested by Yamaguchi, in the process of Liegl and Aoki because Yamaguchi teaches that this combination allows for a finer resist pattern to be formed when a thin layer of resist is used in a photolithography process.

4. Claims 21, 25, 29, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liegl (U.S. Patent Publication 2004/0121264) in view of Aoki (U.S. Patent Publication 2005/0237350), as applied to claims 19, 23, 27, and 31 above, and further in view of Bibl (U.S. Patent Publication 2006/0007271).

The teachings of Liegl and Aoki have been discussed in paragraph 2 above.

Liegl and Aoki fail to disclose that the amount of composition that is discharged at a time is in the range of 10 pl to 70 pl.

Bibl discloses a description of printheads that are used in ink jet printers. Bibl discloses in the background that high performance printheads provide drop sizes of about 1 to 70 picoliters (pl) or less (Paragraph 0002), which is within the range of claims 21, 25, 29, and 33 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have discharged the composition in the range of 1 to 70 pl at a time, as suggested by Bibl, in the process of Liegl and Aoki because Bibl teaches that typical ink jet printers discharge small ink droplets.

5. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liegl (U.S. Patent Publication 2004/0121264) and Aoki (U.S. Patent Publication 2005/0237350), as applied to claims 19, 23, 27, and 31 above, and further in view of Park (U.S. Patent Application 2003/0202132).

The teachings of Liegl and Aoki have been discussed in paragraph 2 above. Liegl also discloses that the substrate can include one or more device layers, which can include conductive materials (Paragraph 0009). Liegl states that the photoresist comprises components, such as photosensitive compounds, which are dissolved in a solvent (Paragraph 0010), as recited in claim 14 of the present invention. Finally, Liegl states that the invention is used to make integrated circuits, which are used in devices such as those recited in claim 15 of the present invention.

Liegl and Aoki fail to disclose the steps of the method recited in claims 13-15 of the present invention.

Park discloses a method of manufacturing a liquid crystal display device which include the steps of: depositing a first metal layer onto a substrate, patterning the metal layer to form a gate line with a gate electrode, placing an insulating layer over the gate electrode, depositing an amorphous silicon layer over the gate insulating layer, patterning the amorphous silicon layer to form a semiconductor island, depositing a second metal layer onto the semiconductor island, patterning the second metal layer to form a source electrode, forming a passivation film over the surface of the substrate, depositing a conductive layer on the passivation film, applying a negative photoresist onto the conductive layer, exposing the resist using a mask, patterning the conductive layer to form a pixel electrode, and baking the material to remove unwanted resist (Claim 1), all of which are recited in claim 13 of the present invention. The steps of patterning use a step-and-repeat exposure technique, which comprises front-side exposure (Paragraph 0057) of the substrate. The patterning steps are also recited in claim 13 of the present invention. Park states that only one of each type of electrode is formed. However, it would have been obvious to one of ordinary skill in the art at the time of invention to have repeated the process to form the desired device with the desired number of conductive layers to form a functional device. Finally, Park is teaching a method for manufacturing a liquid crystal display device, which is recited in claim 15 of the present invention.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have used a photoresist, as taught by Liegl, in the process of patterning the source and gate electrodes of Park because Liegl teaches that the photolithographic process of patterning a substrate using a photoresist is used to make circuit patterns, which could be components such as electrodes. It also would have been obvious to have applied the photoresist, as taught by Liegl and Aoki, in the process of Park because this is a common process for coating a liquid photoresist on a substrate with the prevention of the formation of air bubbles in the photoresist layer and the double patterning technique allows for a more accurate pattern to be formed.

6. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liegl (U.S. Patent Publication 2004/0121264), Aoki (U.S. Patent Publication 2005/0237350), and Park (U.S. Patent Application 2003/0202132) as applied to claims 13-15, 19, 23, 27, and 31 above, and further in view of Hagino (U.S. Patent 5380670).

The teachings of Liegl, Aoki, and Park have been discussed in paragraphs 2 and 5 above.

Liegl, Aoki, and Park fail to disclose that channel protective layers are formed on the semiconductor islands and that a plurality of second semiconductor islands are formed over the channel protective layers.

Hagino discloses a method for fabricating a semiconductor device comprising forming a plurality of semiconductor islands on a top surface of a first part of a semiconductor layer (Claim 5) and forming a second plurality of semiconductor islands on the top surface of a second part of a semiconductor layer, wherein the second

plurality of semiconductor islands are aligned with the first plurality of semiconductor islands (Claim 6) and a semiconductor layer being placed between the two types of islands, as recited in claim 16 of the present invention, which can be used as a protective layer.

Liegl teaches the limitations of dependent claims 17 and 18 in paragraph 3 above.

It would have been obvious to one of ordinary skill in this art, at the time of invention by applicant, to have modified the process of manufacturing a crystal display device of Park, Liegl, and Aoki by forming a plurality of second semiconductor islands on top of the first semiconductor islands, with protective layers in between, as suggested by Hagino because Hagino teaches that this is a common technique in the fabrication of semiconductor devices and semiconductor islands are common components formed on semiconductor devices.

Response to Arguments

7. Applicant argues that neither Lei nor Park disclose or suggest the formation of a plurality of resist patterns by discharging a composition (or by ink jetting) under reduced pressure in the rejection of claims 13-15. Applicant also argues that neither Lei nor Park use a development process to form the second resist patterns. Examiner has removed Lei from the art rejections and instead is using the rejection under 35 USC § 103 (a), made by Liegl. Liegl teaches a method of forming a layer of photoresist and reducing the pressure of the environment to remove solvent and further exposing and developing the photoresist to form patterns. Although Liegl does not teach the use of

ink jetting to form a first plurality of resist patterns, it would be obvious to one of ordinary skill in this art to have used this method for forming a first set of patterns and to have further used the method of Liegl to produce a second set of resist patterns from the first resist patterns. Examiner has included the reference, Aoki, which teaches the feature of using ink jetting for printing resist patterns onto a substrate. It would also have been obvious to one of ordinary skill in the art to have been able to use this double resist pattern process in the process of Park for the formation of a crystal display device because Liegl teaches that conventional photolithographic processes of patterning a substrate using a photoresist is used to make circuit patterns, which could include components that are formed in a crystal display device.

Applicant argues that Hagino also does not disclose the use of the plurality of resist patterns in the rejection of claims 16-18. Hagino provides teachings for the semiconductor processing steps and features. As discussed in paragraph 6 above, Liegl and Aoki provide the teachings of the use of a plurality of resist features. All references do not need to provide all teachings in a 35 USC § 103 rejection.

Applicant argues that neither Lei, Liegl, Yu, Park, nor Hagino disclose or suggest the formation of a plurality of resist patterns by discharging a composition (by ink jetting) under reduced pressure for the rejection of the new claims 19-34. As discussed above, the use of Liegl in view of the new reference, Aoki, can be used to disclose the formation of first resist patterns by ink jetting, as recited in the new independent claims 19, 23, 27, and 31. Examiner has added the references, Yamaguchi and Bibl, for the rejection of dependent claims 20-22, 24-26, and 28-30.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brittany Raymond whose telephone number is 571-272-6545. The examiner can normally be reached on Monday through Friday, 8:00 a.m. - 4:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

blr


KATHLEEN DUDA
PRIMARY EXAMINER